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ABSTRACT

In their development of curriculum for the humanizing of learning, Research for Better Schools, Inc., has required the reorganization, reordering, and creation of instrumentation for evaluation in the higher-order cognitive skills, the affective skills, and the interpersonal skills. As part of their design, a critical organization and review of the state of the art for test-like instruments was made with the goal in mind of identifying those instruments and techniques with auto-feedback formats appropriate to curriculum packages under development. A taxonomy of feedback devices based on degree of mechanical complexity and amount of feedback provided was developed. (Author)

ED 060061

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CENTER FOR THE
STUDY OF
EVALUATION
UCLA
Graduate School
of Education
Los Angeles, California

A CRITICAL SURVEY OF AUTO-FEEDBACK DEVICES IN EDUCATION

Joyce DeMuth and Ralph Hoepfner

CSE Report No. 68
April 1971

TM 001 147

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Marvin C. Alkin, Director

[redacted]

UCLA Graduate School of Education

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In partial fulfillment of an
agreement between

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and
Humanizing Learning Program
Research for Better Schools, Inc.
Philadelphia, Pennsylvania

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In their development of curriculum for the humanizing of learning, Research for Better Schools, Inc., has required the reorganization, reordering, and creation of instrumentation for evaluation in the curriculum areas of the higher-order cognitive skills, the affective skills, and the interpersonal skills. As part of the design for their necessarily innovative curriculum and evaluation materials, a critical organization and a review of the state of the art for test-like instruments and techniques were made with the goal in mind of identifying those instruments and techniques with auto-feedback formats appropriate to curriculum packages under development. Such formats were seen as fitting the needs of the humanized learning curricula and evaluations.

Test-Like Instruments Utilizeable as Auto-Feedback Devices

The search for test-like instruments which could be utilized as auto-feedback devices was concentrated in two areas:

(1) measurement instruments and

(2) self-instructional devices or materials which employ feedback as a part of their lesson format.

The examination of the first area yielded a dearth of information. Out of more than one thousand tests, published and unpublished, only two were identified as fitting into the "feedback-test" category. They are the Kuder Preference Record and the Self-Directed-Search, both of which are vocational interest surveys.

The Kuder instrument is not necessarily self-administered or self-scored, but the examinee may take the test by himself, score it by

counting pin holes in diagrams cleverly concealed in the answer pad, create his own profile of interest traits, and interpret it on the basis of the information provided in interpretation manuals. It is recommended by the author that anyone using the Kuder Preference Record should have at least a sixth-grade reading vocabulary. While such a reading vocabulary is adequate for responding to the schedule, it is not adequate for an understanding of the rather general interpretive advice found in the interpretation protocols. These protocols are not prescriptive, and to be useful they require considerable skill in making personnel and psychological inferences.

The Self-Directed-Search (SDS), developed by J. Holland, is administered, scored, profiled, and interpreted by the student. It is designed to show the student how closely he resembles each of six occupational personality types and then guides him in considering jobs that fit his profile. The author suggest that the test be used by high school or college students although he notes that children as young as nine years have successfully completed the SDS.

Taxonomy of Auto-Feedback Devices

Within the wide range of types of feedback employed by self-instructional devices, no test-like instruments were found. The nature of auto-instructional materials is usually such that feedback is supplied on a frame-by-frame or step-by-step basis during instruction rather than waiting until a substantial amount of information has been covered before testing and providing feedback. It is also generally felt, although the literature presents conflicting viewpoints,

that feedback should be provided immediately after the response has been made to the instructional unit. Therefore, the idea of supplying feedback only at the end of a test is in opposition to the concept of many self-instructional materials.

The mechanical complexity of the feedback devices which were identified and the amount of information supplied by these devices vary widely. For this reason, a taxonomy was developed and each auto-feedback device was classified according to the specific characteristics that defined a particular row and column of the taxonomy. (See Figure 1.)

Mechanical Complexity. The rows of the taxonomy of auto-feedback devices are defined by the complexity of the devices. The simplest devices (Row 1) are those which employ printed feedback not requiring special equipment to make responses. The majority of programmed texts would fit into this category. In these texts the question format is usually multiple choice, with the correct answer provided at the side of the page or at the beginning of the next frame.

The second level of mechanical complexity encompasses those printed feedback devices which require special equipment to make or interpret the responses (Row 2.) For example, Nobel and Nobel have developed a red acetate overlay which, when placed on an area of overprinting, will reveal the answer. This device falls into the category of devices which require special equipment to interpret the response. A feedback device which requires special equipment to make the response is the chemical feedback developed by A. B. Dick. This demands the use of a water pen which, when touched to a dot impregnated with a special ink, will cause the dot to turn green.

Figure 1

Taxonomy of Auto-Feedback Devices

	A	B	C	D	E
	Indicates that answer is right or wrong.	Indicates that answer is right or wrong and states why.	Indicates that answer is right or wrong and states why; for wrong answer gives additional info and questions again.	Ascertains level at which student passed or missed question--automatically branches student to appropriate level of instruction.	Student develops own pattern or profile which provides feedback about him.
. Printed feedback device which does not require special equipment to make responses					
2. Printed feedback device which requires special equipment to make or interpret the responses					
3. Simple portable mechanical feedback device not requiring batteries or electricity					
4. Portable mechanical feedback device requiring batteries or electricity					
5. Non-portable, professionally-installed, electrical feedback device requiring periodic servicing					

The Cycloteacher is an example of a simple portable mechanical feedback device which does not require batteries or electricity to operate (Row 3.) Simple movement of a switch allows the student both to expose the next frame and to see the answer to the previous frame. These auto-feedback devices are usually lightweight enough to be handled by most elementary school children. There is a minimum of moving parts and care has been taken to child-proof the devices.

The majority of identified auto-feedback devices fall into the category of portable, mechanical feedback devices which require batteries or electricity (Row 4.) The cost of these devices rises sharply above those in Rows 1, 2, and 3; however, many offer multi-media programs in the form of a slide display coupled with a taped lesson. Although the devices are considered portable, most would require an adult to move them.

The Instroscope is an example of a non-portable, professionally installed, electrical auto-feedback device which would require periodic maintenance (Row 5.) This is mechanically the most complex type of device and also the most expensive. These devices can service a larger number of learners than the simpler devices and they are able to handle diverse presentations of information.

Amount of Feedback. The five columns of the taxonomy are defined by the amount of information feedback supplied by the auto-feedback devices. The least amount of feedback simply indicates to the student that his answer is right or wrong (Column A). Frequently the student matches his answers with one supplied at the bottom or side of the frame. In the case of the chemical feedback described earlier the learner would first be taught the "meaning" of the color of the feedback dot, i.e., red means the answer is wrong, green means the answer is right. This method is often used to supply feedback to non-readers.

The next level of feedback, Column B, contains devices which indicate whether the answer is right or wrong and state why. Devices in Column C, in addition to showing whether the answer is right or wrong, give additional information following an incorrect response and then question the student again. Frequently the same question is repeated on the second attempt although some writers try to develop parallel questions. This type of device could also be considered to include mini-branching feedback since the student is briefly removed from the mainstream of the program, supplied with corrective information and brought back into the mainstream again.

Feedback which ascertains the level at which the student passes or misses the question and then automatically branches him to the appropriate level of instruction is designated by Column D. This type of feedback demands a sophisticated mechanical device which is capable of handling numerous remedial branching sequences.

Column E designates devices whereby the student develops his own profile or a pattern which provides feedback about him. The feedback obtained by these devices contains some aspects which are not present in the other four types of feedback. First, a sequence of instruction is not necessarily provided prior to the response; usually it is just a test question. Consequently the student's answers are not viewed as being right or wrong but as a reflection of his attitudes or reactions. Second, it is necessary for the student to be able to follow what may be a complex set of directions to obtain feedback. This aspect may limit the use of this type of feedback to those who are capable of following sequential directions. The third and final characteristic of entries in Column E is that it is possible to obtain a great deal of feedback from this type of profile without using any type of mechanical device.

By far the majority of feedback devices fall in Column A of Rows 1, 2, 3, and 4. These rows cover a range of feedback devices from the simple printed type to portable devices which require batteries or electricity for operation; the column signifies that the feedback merely indicates that the answer is right or wrong. It can be seen that as the feedback devices become more complex mechanically they do not necessarily provide a greater amount of feedback information. However, the state of the art indicates that any feedback device which could ascertain the level at which a student passes or misses a question and then automatically branch him to the appropriate level of instruction would be a complex device. The cells of the taxonomy with their device entries listed appear in Appendix A.*

Implications of Available Auto-Feedback Devices

What are the implications related to the development and use of test-like instruments that can be utilized as auto-feedback to the learner? It is immediately obvious that the use of mechanically sophisticated devices is both impractical and unwarranted if the device is not to be used for instruction as well as testing. Our considerations, therefore, will be in light of the non-mechanical or mechanically simple auto-feedback devices and some of the problems in their use.

1. Age limitations. There is a very real difficulty in determining the minimum age at which a learner can utilize auto-feedback, whether in a teaching or testing situation. As noted earlier, the Kuder Preference Test

*It will be noted that there are only two entries in Row 5, Columns A, B, C, D, and E. This is not because these mechanically sophisticated feedback systems do not exist in larger numbers but rather that for this project such complex devices were not of primary interest and therefore no attempt was made to search them out.

requires a sixth-grade reading vocabulary level while the Self-Directed-Search is recommended for high school students. The key requirement, beyond taking the test, is the ability to follow the directions necessary to score, profile and interpret the test. Typically, the young learner's ability restricts him to a very simple routine which obtains what is unfortunately very simplistic feedback.

2. Test content restrictions. The more simple the auto-feedback device is mechanically, the less information and direction it can provide for the learner. This limits the instruction or testing to asking those types of questions which may be answered with "yes" or "no," or with the selection of a multiple-choice item. In either instance it may exclude the use of items which assess some of the higher-level cognitive skills.

3. Prescriptive feedback. The idea that feedback would allow the learner to modify his errors and increase the probability of future correct responses was one of the tenets of programmed instruction. However, it has become increasingly clear that the uniqueness of a learner and his past experience in handling information play a large part in the effectiveness of feedback. No one feedback system can be said to equally effective with learners who differ in race, age, cultural background, or perceived need for information acquisition.

The traditional role of feedback has been to confirm or negate a response the learner has made. However, it is possible to conceive of feedback as a system which supplies on-going directions for future actions. This type of feedback can be considered as a progression through which the learner is given increasingly more information on a step-by-step basis. This progression is approached by the Self-Directed-Search where the initial scoring is

the first step in obtaining feedback, the profiling is the second, and the interpreting is the third step.

Training programs could be developed to instruct learners, ranging from elementary school youngsters to adults, in the basic steps of dealing with a progression feedback system. This system could supply the learner with a greater amount of feedback than the average simple mechanical device; it would also allow for the building of complex sequences of questions. In addition, a feedback progression could be designed on a branching basis to meet some of the identified needs of individuals. After completing one step of a specified feedback progression, one learner's behavior might be reinforced by allowing him to select another activity; a second learner might be directed to an adult who would supply verbal praise; while a third learner could complete the progression and begin another without any such branching for reinforcement.

APPENDICES

APPENDIX A

CELLS OF THE AUTO-FEEDBACK TAXONOMY AND THEIR DEVICE ENTRIES

This appendix allows one page for each cell of the taxonomy, with blanks for the entries. Those devices presently available are entered into the blanks. The remaining blanks are provided for devices either not uncovered by CSE in its review or those not yet developed or distributed.

CELL 1A

1 = Printed feedback device which does not require special equipment to make responses.

A = Indicates that the answer is right or wrong.

California Test Bureau, Scrambled Text

Coronet Learning Programs

Learning Incorporated Answer Panel

McGraw-Hill Book Company

Self-Scoring Flexilevel Test

Self-Trainer

TMI-Grolier Programmed Text

Trainer-Testor Response Card

CELL 1B

1 = Printed feedback device which does not require special equipment to make responses.

B = Indicates that answer is right or wrong and states why.

CELL 1C

1 = Printed feedback device which does not require special equipment to make responses.

C = Indicates that answer is right or wrong and states why; for wrong answer gives additional information and questions again.

CELL 1D

1 = Printed feedback device which does not require special equipment to make responses.

D = Ascertains level at which student passed or missed question--automatically branches student to appropriate level of instruction.

CELL 1E

1 = Printed feedback device which does not require special equipment to make responses.

E = Student develops own pattern or profile which provides feedback about him.

Kuder General Interest Survey

Self-Directed-Search

CELL 2A

2 = Printed feedback device which requires special equipment to make or interpret the responses.

A = Indicates that answer is right or wrong.

A. B. Dick Chemical Feedback

Docent Responsive Answer Sheets

Nobel & Nobel

CELL 2B

2 = Printed feedback device which requires special equipment to make or interpret the responses.

B = Indicates that answer is right or wrong and states why.

CELL 2C

2 = Printed feedback device which requires special equipment to make or interpret the responses.

C = Indicates that answer is right or wrong and states why; for wrong answer gives additional information and questions again.

CELL 2D

2 = Printed feedback device which requires special equipment to make or interpret the responses.

D = Ascertains level at which student passed or missed question--automatically branches student to appropriate level of instruction.

CELL 2E

2 = Printed feedback device which requires special equipment to make or interpret the responses.

E = Student develops own pattern or profile which provides feedback about him.

CELL 3A

3 = Simple portable mechanical feedback device not requiring batteries or electricity.

A = Indicates that answer is right or wrong.

Beseler Grade-O-Mat

Cycloteacher

ESA Canterbury Teaching Machine, Mark II

Telor

Testmate Responder

Touchtutor Teaching Machine

Tutorpack, Model B

CELL 3B

3 = Simple portable mechanical feedback device not requiring batteries or electricity.

B = Indicates that answer is right or wrong and states why.

CELL 3C

3 = Simple portable mechanical feedback device not requiring batteries or electricity.

C = Indicates that answer is right or wrong and states why; for wrong answer gives additional information and questions again.

CELL 3D

3 = Simple portable mechanical feedback device not requiring batteries or electricity.

D = Ascertains level at which student passed or missed question--automatically branches student to appropriate level of instruction.

CELL 3E

3 = Simple portable mechanical feedback device not requiring batteries or electricity.

E = Student develops own pattern or profile which provides feedback about him.

CELL 4A

4 = Portable mechanical feedback device requiring batteries or electricity.

A = Indicates that answer is right or wrong.

Acoustitone

Audio Flashcard System

Automata 450

Bell & Howell Language Master

Borg-Warner Educational Systems, System 80

Craig 8127

Craig Reader

Devereux Model 50

Educational Projections Corporation

Electronic Card Reader

Higgens Teledesk

Hoffman Audiovisual instructional system in reading

Honor Teaching Machine

Labo 12 + 2

Mast Teaching Machine

Math Mastery Tapes

MTA S-R 400 Stimulus Programmer

Norelco PIP System

Norelco Synchrotutor

SR - 400 Programmer

V-M Model 703 AV

CELL 4B

4 = Portable mechanical feedback device requiring batteries or electricity.

B = Indicates that answer is right or wrong and states why.

EDL Basic Systems, Aud-X

CELL 4C

4 = Portable mechanical feedback device requiring batteries or electricity.

C = Indicates that answer is right or wrong and states why; for wrong answer gives additional information and questions again.

CELL 4D

4 = Portable mechanical feedback device requiring batteries or electricity.

D = Ascertains level at which student passed or missed question--automatically branches student to appropriate level of instruction.

CELL 4E

4 = Portable mechanical feedback device requiring batteries or electricity.

E = Student develops own pattern or profile which provides feedback about him.

CELL 5A

5 = Non-portable, professionally-installed, electrical feedback device requiring periodic servicing.

A = Indicates that answer is right or wrong.

Instructoscope

CELL 5B

5 = Non-portable, professionally-installed, electrical feedback device requiring periodic servicing.

B = Indicates that answer is right or wrong and states why.

CELL 5C

5 = Non-portable, professionally-installed, electrical feedback device requiring periodic servicing.

C = Indicates that answer is right or wrong and states why; for wrong answer gives additional information and questions again.

CELL 5D

5 = Non-portable, professionally-installed, electrical feedback device requiring periodic servicing.

D = Ascertains level at which student passed or missed question--automatically branches student to appropriate level of instruction.

E1 9000

CELL 5E

5 = Non-portable, professionally-installed, electrical feedback device requiring periodic servicing.

E = Student develops own pattern or profile which provides feedback about him.

Appendix B

AUTO-FEEDBACK SYSTEMS CATEGORIZED

ACCORDING TO THE TAXONOMY

1A

California Test Bureau, Scrambled Text
Coronet Learning Programs
Learning Incorporated Answer Panel
McGraw-Hill Book Company
Self-Scoring Flexilevel Test
Self-Trainer
TMI-Grolier Programmed Text
Trainer-Testor Response Card

1E

Kuder General Interest Survey
Self-Directed-Search

2A

A. B. Dick Chemical Feedback
Docent Responsive Answer Sheets
Nobel & Nobel

3A

Beseler Grade-O-Mat
Cycloteacher
ESA Canterbury Teaching Machine, Mark II
Telor
Testmate Responder
Touchtutor Teaching Machine
Tutorpack, Model B

4A

Acoustitone
Audio Flashcard System
Automata 450
Bell & Howell Language Master
Borg-Warner Educational Systems, System 80
Craig 8127
Craig Reader
Devereux Model 50
Educational Projections Corporation
Electronic Card Reader
Higgens Teledesk
Hoffman Audiovisual instructional system in reading

Honor Teaching Machine
Labo 12 + 2
Mast Teaching Machine
Math Mastery Tapes
MTA S-R 400 Stimulus Programmer
Norelco PIP System
Norelco Synchrotutor
SR-400 Programmer
V-M Model 703 AV

4B

EDL Basic Systems, Aud-X

5A

Instructoscope

5D

El 9000

Appendix C

ALPHABETIZED LISTING OF FEEDBACK SYSTEMS

AND TAXONOMY CATEGORIES

A. B. Dick Chemical Feedback	2A
Acoustitone	4A
Audio Flashcard System	4A
Automata 450	4A
Bell & Howell Language Master	4A
Beseler Grade-O-Mat	3A
Borg-Warner Educational Systems, System 80	4A
California Test Bureau, Scrambled Text	1A
Coronet Learning Programs	1A
Craig 8127	4A
Craig Reader	4A
Cycloteacher	3A
Devereux Model 50	4A
Docent Responsive Answer Sheets	2A
EDL Basic Systems, Aud-X	4B
Educational Projections Corporation	4A
El 9000	5D
Electronic Card Reader	4A
ESA Canterbury Teaching Machine, Mark II	3A
Higgens Teledesk	4A
Hoffman Audiovisual instructional system in reading	4A
Honor Teaching Machine	4A
Instructoscope	5A
Kuder General Interest Survey	1E
Labo 12 + 2	4A
Learning Incorporated Answer Panel	1A
Mast Teaching Machine	4A
Math Mastery Tapes	4A
McGraw-Hill Book Company	1A
MTA S-R 400 Stimulus Programmer	4A
Nobel & Nobel	2A
Norelco PIP System	4A
Norelco Synchrotutor	4A
Self-Directed-Search	1E
Self-Scoring Flexilevel Test	1A
Self-Trainer	1A
SR-400 Programmer	4A

Telor	5A
Testmate Responder	5A
TMI-Grolier Programmed Text	1A
Touchtutor Teaching Machine	5A
Trainer-Testor Response Card	1A
Tutorpack, Model B	5A
V-M Model 703 AV	4A

APPENDIX D

ALPHABETIC LISTING OF PUBLISHERS AND DISTRIBUTORS OF AUTO-FEEDBACK SYSTEMS

(Form letters were sent to all listed organizations, requesting information regarding their products.)

A. B. DICK COMPANY
5700 West Touhy Avenue
Chicago, Illinois 60648

THE ADVANCE PRODUCTS COMPANY, INC.
2300 East Douglas
Wichita, Kansas 67214

ALESCO--AMERICAN LIBRARY &
EDUCATIONAL SERVICE COMPANY
404 Sette Drive
Paramus, New Jersey 07652

AMERICAN EDUCATIONAL FILMS
331 North Maple Drive
Beverly Hills, California 90210

AMERICAN LIBRARY ASSOCIATION:
AMERICAN ASSOCIATION OF SCHOOL
LIBRARIANS LIBRARY TECHNOLOGY
PROGRAM
50 East Huron Street
Chicago, Illinois 60611

AMPEX CORPORATION
2201 Estes Avenue
Elk Grove Village, Illinois 60007

ARGUS COMMUNICATIONS
3505 North Ashland Avenue
Chicago, Illinois 60657

ARION CORPORATION
825 Boone Avenue, North
Minneapolis, Minnesota 55427

ARRIFLEX CORPORATION OF AMERICA
Woodside, New York 11377

AUDIT AND ASSOCIATED COS.
195 Broadway
New York, New York 10007

AUDIO-TUTORIAL SYSTEMS, A DIVISION
OF BURGESS PUBLISHING COMPANY
426 South 6th Street
Minneapolis, Minnesota 55415

AUDIO VISUAL INSTRUCTIONAL DEVICES
120 South Hamilton
Marshall, Michigan 49068

AUDIO VISUAL INSTRUMENTS INC.
525 Montrose Street
Wood Dale, Illinois 60191

A-V ELECTRONICS, INC.
240 South Teilman Avenue
Fresno, California 93706

AVID CORPORATION
10 Tripps Lane
East Providence, Rhode Island 02914

CHARLES BESELER COMPANY
219 South 18th Street
East Orange, New Jersey 07018

BFA EDUCATIONAL MEDIA
2211 Michigan Avenue
Santa Monica, California 90404

BOMMAR
622 Rodier Drive
Glendale, California 91201

BRETFORD MANUFACTURING INC.
3951 25th Avenue
Schiller Park, Illinois 60176

BRO-DART, INC.
1609 Memorial Avenue
Williamsport, Pennsylvania 17701

BUHL PROJECTOR COMPANY, INC.,
DIVISION OF INTERNATIONAL
EDUCATIONAL & TRAINING, INC.
1776 New Highway
Farmingdale, New York 11735

BUSCH FILM & EQUIPMENT COMPANY
214 South Hamilton
Saginaw, Michigan 48602

CENTRON EDUCATIONAL FILMS
Suite 625
Post Street
San Francisco, California 94109

CLASSROOM WORLD PRODUCTIONS
Raleigh, North Carolina

CLASSROOM WORLD PRODUCTIONS
New York, New York

JACK C. COFFEY COMPANY, INC.
104 Lake View Avenue
Waukegan, Illinois 60085

COOPER FILMS AND RECORDS, INC.
Cooper Building
Winchendon, Massachusetts 01475

CORONET FILMS
65 East South Water Street
Chicago, Illinois 60601

CYBERVOX SYSTEMS INC.
2224 Hewlett Avenue
Merrick, New York 11566

DOUBLE SIXTEEN COMPANY
1028 College Avenue
Wheaton, Illinois 60187

DATA INSTITUTE, INC.
Suite 303E
200 Park Avenue
New York, New York 10017

DCA EDUCATIONAL PRODUCTS, INC.
4865 Stenton Avenue
Philadelphia, Pennsylvania 19144

DEMOYER-GEFFERT AUDIO-VISUALS
5235 Ravenswood Avenue
Chicago, Illinois 60640

DICTATION DISC COMPANY
240 Madison Avenue
New York, New York 10016

WALT DISNEY EDUCATIONAL
MATERIALS COMPANY
800 Sonora Avenue
Glendale, California 91201

DIXON WRITING PRODUCTS DIVISION,
THE JOSEPH DIXON CRUCIBLE COMPANY
167 Wayne Street
Jersey City, New Jersey 07303

DOUBLEDAY MULTIMEDIA
100 Park Avenue
New York, New York 10017

EDUCASTING--TRIANGLE PUBLICATIONS
P. O. Box 85
Radnor, Pennsylvania 19087

EDUCATIONAL PROJECTIONS CORPORATION
AN ALCO STANDARD COMPANY
527 South Commerce Street
Jackson, Mississippi 39205

EDUCATIONAL TECHNOLOGY, INC.
2224 Hewlett Avenue
Merrick, New York 11566

EMC CORPORATION
180 East 6th Street
St. Paul, Minnesota 55101

ENCYCLOPEDIA BRITANNICA
EDUCATIONAL CORPORATION
425 North Michigan Avenue
Chicago, Illinois 60611

ENRICH
3437 Alma Street
Palo Alto, California 94306

EYE GATE HOUSE, INC.
146-01 Archer Avenue
Jamaica, New York 11435

FILMSTRIP HOUSE, INC.
432 Park Avenue, South
New York, New York 10016

FORDHAM EQUIPMENT &
PUBLISHING COMPANY, INC.
2377 Hoffman Street
Bronx, New York 10458

GENERAL LEARNING CORPORATION
MEDIA DIVISION & SILVER BURDETT
COMPANY, DIVISION GENERAL
LEARNING CORPORATION
Morristown, New Jersey 07960

GENERAL PROGRAMMED TEACHING
428 University Avenue
Palo Alto, California 94302

GINN & COMPANY, A XEROX COMPANY
125 Second Avenue
Waltham, Massachusetts 02154

GREAT PLAINS NATIONAL INSTRUCTIONAL TELEVISION LIBRARY
University of Nebraska
Lincoln, Nebraska 68508

GUIDANCE ASSOCIATES
Pleasantville, New York 10570

HOFFMANN CORPORATION
5410 Port Royal Road
Springfield, Virginia 22151

HUBBARD SCIENTIFIC COMPANY
2855 Shermer Road
Northbrook, Illinois 60062

IDEAL SCHOOL SUPPLY COMPANY
11000 South Lavergne
Oak Lawn, Illinois 60453

IMPERIAL INTERNATIONAL LEARNING
P. O. Box 548
Kankakee, Illinois 60901

INSTRUCTOMATIC, INC.
30625 West 8 Mile Road
Livonia, Michigan 48152

INTERMEDIA SYSTEMS CORPORATION
711 Massachusetts Avenue
Cambridge, Massachusetts 02139

KNOWLEDGE AID
6633 West Howard
Niles, Illinois 60648

LEARNING RESEARCH ASSOCIATES, INC.
1501 Broadway
New York, New York 10036

LEARNING RESOURCES MANUFACTURING COMPANY
Cedar Brook, New Jersey 08018

McGRAW-HILL--FILMS, COLLEGE & WEBSTER DIVISIONS, & EDL/McGRAW-HILL
330 West 42nd Street
New York, New York 10036

MEDIA SYSTEMS CORPORATION
250 West Main
Morristown, New Jersey 08057

MEDICAL COACHES INC.
Oneonta, New York 13820

ROBERT C. MERCHANT
box 246
Carmel Valley, California 93924

MPATI, INC., NATIONAL VIDEO LIBRARY
Purdue University
Lafayette, Indiana 47902

NATIONAL BLANK BOOK COMPANY, INC.
P. O. Box 791
Holyoke, Massachusetts 01040

PROGRAMMING SCIENCES CORPORATION
6 East 43rd Street
New York, New York 10017

RESPONSE SYSTEMS CORPORATION
Edgemont, Pennsylvania 19028

RETENTION COMMUNICATION SYSTEMS, INC.
Two Penn Plaza
New York, New York 10001

RHEEM CALIFONE
5922 Bowcroft Street
Los Angeles, California 90016

SPINDLER & SAUPPE, INC.
1329 Grand Central Avenue
Glendale, California 91201

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